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JAN JĘDRZEJEWICZ – A PROFESSIONAL AMONG AMATEUR ASTRONOMERS

JAN JĘDRZEJEWICZ – PROFESJONALISTA WŚRÓD ASTRONOMÓW AMATORÓW

Abstract

Jan Jędrzejewicz was an eminent Polish amateur astronomer. He lived and worked as a doctor in a small town of Płońsk, situated 60 km of Warsaw. His great passion was astronomy and he devoted his all free time to it. After gaining essential knowledge, he built observatory, which he professionally equipped with his own funds. The main subject of his work was micrometer measurements of double stars, to which he applied himself with unusual precision and diligence. This was appreciated by an American astronomer S.W. Burnham, who included these results in his catalogue of double stars. Jędrzejewicz also observed the Sun, comets, planets and other sky phenomena, and the results of his works were published in the international journals: "Astronomische Nachrichten" and "Vierteljahrsschrift Astronomischen Ggesellschaft". Noteworthy in his papers are extremely thorough investigation of the subject and a great number of references to papers of contemporaneous professional astronomers. Jędrzejewicz aroused interest of the scientific world, which was demonstrated by the fact that information about him appeared several times in the journal "Nature".

Keywords: *astronomy in Poland*, *nineteen-century astronomy*, *amateur astronomy*

Streszczenie

Jan Jędrzejewicz był wybitnym polskim astronomem amatorem. Mieszkał i pracował jako lekarz w małej miejscowości Płońsk, leżącej 60 km od Warszawy. Jego wielką pasją była astronomia, której poświęcał cały wolny czas. Po zdobyciu niezbędnej wiedzy postanowił zbudować obserwatorium, które z własnych środków profesjonalnie wyposażył. Głównym tematem prac Jędrzejewicza były pomiary mikrometryczne gwiazd podwójnych, którym poświęcał się z niezwykłą precyzją i sumiennością. Zostało to docenione przez amerykańskiego astronoma S.W. Burnhama, który umieścił te wyniki w swoim katalogu gwiazd podwójnych. Jędrzejewicz obserwował również Słońce, komety, planety i wszelkie pojawiające się w owym czasie na niebie zjawiska, a wyniki swoich prac publikował w zagranicznych czasopismach: „Astronomische Nachrichten" i „Vierteljahrsschrift Astronomischen Ggesellschaft". W pracach Jędrzejewicza na uwagę zasługują jego niezwykle dogłębne badanie tematu oraz liczne odnośniki do prac współczesnych mu zawodowych astronomów. Jerzejewicz wzbudzał zainteresowanie świata naukowego, o czym może świadczyć fakt, że kilkakrotnie pojawiła się o nim informacja w czasopiśmie „Nature".

Słowa kluczowe: *astronomia w Polsce*, *astronomia dziewiętnastowieczna*, *astronomia amatorska*

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1. Introduction

Jan Jędrzejewicz was born in 1835 in Warsaw. His father was an insurgent exiled to Syberia, who after his return worked in the judiciary. Jędrzejewicz attended secondary schools in Warsaw and then began to study architecture at the School of Fine Arts. Due to deteriorating eyesight he dropped out of college but in 1856 he started medical studies at the University of Moscow[1]. In 1862, as a qualified doctor, Jędrzejewicz moved to Płońsk, where he began his medical practice. He lived and worked in Płońsk almost continuously until his untimely death in 1887. He contracted typhus- probably from one of his patients- and, being overworked, he was not able to fight the disease[2].

Outside professional life Jędrzejewicz had a great passion – astronomy. He devoted to it all of his free time and probably all of his savings. But Jędrzejewicz's interest in astronomy was not limited to reading books and articles on the subject and watching the sky on a clear night. He decided to built his own observatory and make his contribution to the development and popularization of that field of science.

2. Observatory at Płońsk

From 1873 to 1875 he built observatory by himself and equipped it with the instruments for astronomical and meteorological observations. In the first building of the observatory there was a transit instrument with an objective diameter of 6.3 cm. It was made in M. Gerlach's workshop in Warsaw. In the second building, covered by a rotating dome, there was a parallactically mounted telescope with an objective diameter 16.2 cm. Jędrzejewicz ordered it from Steinheil's workshop in Munich. The telescope had eyepieces for stellar and solar observations and also a Merz ring micrometer[3]. It was the most important observational instrument in the observatory.

In 1883 Jędrzejewicz bought a Cooke refractor from the widow of Antoni Lewicki, who had built his astronomical observatory in Częstochowa. The telescope with an objective diameter of 14 cm had a clockwork mechanism allowing one to keep up with daily rotation of the sky[4]. The refractor was ordered from a workshop in London and Jędrzejewicz bought it together with a dome, which enlarged his observatory to three buildings[5].

In addition to those instruments, Jędrzejewicz had a Browning solar spectroscope, a small spectroscope, previously a property of Dr. Vogel, a polarimetric helioscope, a wire

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[1] J. Kowalczyk, *Wiadomości o obserwatorium w Płońsku i o pracach Jana Jędrzejewicza w dziedzine astronomii i meteorologii*, Prace matematyczno-fizyczne, t. 1, 1888, p. 113.

[2] H. Dobrzycki, *Dr. Jan Jędrzejewicz. Lekarz, astronom i obywatel, założyciel spostrzegalni astronomicznej i stacyi meteorologicznej w Płońsku*, Medycyna, t. 15, nr 52, 1887, p. 845.

[3] J. Jędrzejewicz, *Schreiben des Hern Dr. Jedrzejewicz an den Herausgeber*, Astronomische Nachrichten, t. 95, nr 2279, 1879, p. 353-354.

[4] J. Jędrzejewicz, *Jahresberichte der Sternwarten fur 1883, Plonsk*, Vierteljahrsschrift der Astronomischen Gesellschaft, t. 19, 1884, p. 129.

[5] J. Kowalczyk, *O działalności ś.p. dra Jana Jędrzejewicza w dziedzinie astronomii i meteorologii*, Wszechświat, t. 7, nr 3, 1888, p. 39.

micrometer, a Busch telescope used as a heliograph, a wedge photometer and also some smaller telescopes[6].

Jędrzejewicz's observatory was very well equipped compared to university observatories located on Polish land. During the observatory's activity, Jędrzejewicz had the biggest refractor in Poland, which allowed him to conduct the most accurate observations. University observatories had many more instruments, because most of them functioned for a longer time and had bigger budgets. Nevertheless, Jędrzejewicz's instruments were newer and selected so that they could be fully used by a single observer. His instruments came from reputable workshops and- what is worth mentioning- they were perfectly selected for a small observatory. They were used to make both fundamental measurements (like determining observatory coordinates) and micrometrical observations of solar system bodies and double stars. Furthermore, they were used to conduct spectroscopic observations, fairly new at that time.

3. Jędrzejewicz's astronomical observations

The range of observations which Jędrzejewicz was able to make with his instruments was quite wide. The most extensive and the most important of them were micrometrical measurements of double stars. In his first article dedicated to that subject Jędrzejewicz explained that "micrometrical measurements of double stars are so important in astronomy that it is necessary to increase their number"[7].

A person who suggested that he should observe double stars was Dr. Hermann Vogel, an astronomer from the observatory in Potsdam. According to him, observations of this kind were perfect for instruments possessed by Jędrzejewicz[8]. Using a Steinheil refractor Jędrzejewicz conducted measurements of the position angle and angular distance between two component stars. It is worth mentioning that Jędrzejewicz chose the stars that had not been observed for a long time and then the stars that needed to be observed regularly. From 1876 to his death in 1887 he measured more than 350 double stars. The results of his measurements were published in "Astronomische Nachrichten" in 14 articles.

A lot of observational time Jędrzejewicz devoted to comets. He made his observations with the Steinheil telescope and later with the Cooke telescope, both equipped with the same ring micrometer. From 1881 to 1887 Jędrzejewicz observed 16 comets. In articles published in "Astronomische Nachrichten" he presented tables with the positions of comets at different times together with the position of reference stars.

An important part of Jędrzejewicz's work were observations of the Sun. In his observations of sunspots Jędrzejewicz followed Dr. Gustav Spoerer, an expert on that phenomenon. Using Busch's telescope, equipped with a screen, he made drawings of sun spots and determined their heliographic coordinates. The most interesting spots were drawn separately and on a larger scale. Positions of spots that were close to an edge of the solar

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[6] J. Kowalczyk, *Wiadomości o obserwatorium w Płońsku...*, *op. cit*., p. 115.

[7] J. Jędrzejewicz, *Mesures micrometriques des etoiles doubles*, Astronomische Nachrichten, t. 97, nr 2324, 1880, p. 305.

[8] J. Jędrzejewicz, *Schreiben des Hern Dr. Jedrzejewicz...*, *op. cit*., p. 355.

disc were measured directly with micrometer mounted on the Steinheil's refractor and were examined with the Browning's solar spectroscope. In Jędrzejewicz's opinion the observations he made could be useful for other observers if there were some accidental gaps in their measurements[9].

Jędrzejewicz also made spectroscopic observations of the Sun but he did not conduct them very often because his spectroscopes were rather small and were used mainly for education. Despite modest equipment he was able to conduct very useful measurements. Jędrzejewicz noticed that in the professional journals there were no sketches of solar spectrum observed with small spectroscope. There were only sketches seen by big instruments, which showed more spectrum lines with bigger precision. This is why he decided to fill the gap[10].

At the end of 1880 and in the beginning of 1881 Jędrzejewicz observed Jupiter. He paid attention to the red spot, which on the grounds of "visible contours could be used to determine the period of rotation of the planet and more specifically of its atmosphere"[11]. Based on the observations of 174 rotations of Jupiter, Jędrzejewicz determined the time of revolution of the red spot around Jupiter and using micrometer he determined the position of the spot.

Moreover, Jędrzejewicz observed the transit of the red spot across the central meridian. He used a method he devised himself for this purpose. He placed a wire of the micrometer in a position that bisects the disc of the planet and then he recorded the times when the eastern edge of the spot touched the wire and when the spot reappeared at the other side of the wire[12].

In addition to the objects already mentioned Jędrzejewicz observed Mercury, Saturn, lunar eclipse and supernova in Andromeda nebula. He attached drawings of some of them to his popular articles published in the Polish magazine "Wszechświat".

On the 19th of August 1887 the total solar eclipse was visible in Western and Central Europe. Like many astronomers, Jędrzejewicz wanted to take this opportunity to observe solar corona and therefore he headed the scientific expedition to Vilnius. He took necessary instruments and carefully prepared the program of observations. Unfortunately, his efforts were wasted because the observations were impossible due to clouds.

Jędrzejewicz's astronomical work gains importance when it is compared to observations made in two major Polish observatories – in Warsaw and Cracow. In Warsaw astronomers made mostly observations of planets, asteroids and comets, but rather occasionally. Only the senior assistant, Jan Kowalczyk, undertook an ambitious program of observations. For 20 years he made positional observations which created a catalogue of stars. Kowalczyk also made calculations in order to determine orbits of planets, asteroids and comets[13]. In Cracow both the director of observatory, Franciszek Karliński, and an assistant, Daniel Wierzbicki, made positional observations of comets and asteroids, but this also happened

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[9] J. Jędrzejewicz, *Jahresberichte der Sternwarten fur 1883...*, *op. cit*., p. 129-130.

[10] J. Jędrzejewicz, *Widma małych spektroskopów*, Wszechświat, t. 4, nr 28, 1885, p. 439-443.

[11] J. Jędrzejewicz, *La tache rouge de Jupiter*, Astronomische Nachrichten, t. 99, nr 2366, 1881, p. 211.

[12] J. Jędrzejewicz, *La tache rouge...*, *op. cit*., p. 212.

[13] J. Kowalczyk, *Krótki rys dziejów Obserwatorium Warszawskiego od r. 1820–1900*, Wiadomości Matematyczne, t. XI, 1907, p. 94-95.

only occasionally[14]. In both observatories astronomical works were put aside because of other duties. Astronomers had to conduct works in meteorology, geophysics (in Cracow) and also geodesy. It was often difficult to make observations because of bad condition of buildings and frequent renovations.

4. Jędrzejewicz in a mainstream of nineteen-century astronomy

In order to assess whether Jędrzejewicz's astronomical work were in the mainstream of nineteen-century astronomy quantitative analysis of observations was made. Observations published in "Astronomische Nachrichten" during the period of time when Jędrzejewicz's articles appeared there were taken into account.

What is the most striking is a fact that astronomers were mostly interested in solar system bodies. As much as 78 percent of observations were devoted to those objects and among those outnumbered were comets. Jędrzejewicz definitely followed that trend and in the years 1881–1887 he observed 16 comets, 14 of which belong to group of 30 comets the most often observed by astronomers in Europe.

In a group of solar system objects – the Sun, planets, moons and meteors – nearly all of them were observed with uniform frequency and there was no object that dominated others in this respect. Jędrzejewicz observed those objects as well and out of 15 presented objects he observed 8.

Observations of objects outside our solar system, that is nebulae and, generally speaking, stars constituted 18 percent of all observations published in "Astronomische Nachrichten". Among the observations included in the group of stars, double stars – Jędrzejewicz's objects of interest- made up as much as one fifth.

Between 1879 and 1887 Jędrzejewicz published 31 articles, 13 of which were devoted to double stars and 13 to comets. Since 1880, every two years he has sent reports on his observational activity to "Vierteljahrsschrift der Astronomischen Gesellschaft" of German astronomical society.

At that time in "Astronomische Nachrichten" only six articles appeared about observations made in other Polish observatories – 4 from Warsaw and 2 from Cracow. Articles from Warsaw presented results of observations of Jupiter, Mercury, 5 asteroids and 2 comets made by Kowalczyk. In Cracow Wierzbicki focused on 3 comets. These numbers are actually difficult to compare with those of Jędrzejewicz's works. As mentioned before, these observations were made occasionally and they were not a part of regular observational program.

5. Recognition in the West

Results of Jędrzejewicz's observations published in international journals were noticed and used by professional astronomers. High quality of the micrometrical measurements made

[14] J. Mietelski, *Obserwatorium Astronomiczne Uniwersytetu Jagiellońskiego w okresie dyrekcji Franciszka Karlińskiego (1862–1902)*, Zeszyty Naukowe Uniwersytetu Jagiellońskiego DCCCIII, Prace Fizyczne, z. 25, 1986, p. 24-27.

by Jędrzejewicz is proved by a great number of double stars catalogues in which his results are presented. Two of them were catalogues created by S.W. Burnham, an American astronomer and double stars observer of international renown[15],[16], and another one by Thomas Lewis, another double star expert[17].

An interesting publication in which Jędrzejewicz's results are included is "A cycle of celestial objects by George F. Chambers"[18]. In the preface to a revised edition, the author specially thanked Jędrzejewicz for his measurements of double stars that other observers often neglected, which helped him to fill the gaps. Besides Jędrzejewicz, the author thanked only one person – S.W. Burnham. This book, from 1881, is probably the first one in which Jędrzejewicz's results were included and appreciated.

Jędrzejewicz's observations of the red spot on Jupiter were also noticed. In "Monthly Notices of the Royal Astronomical Society" Joseph Gledhill, astronomer from Bermerside Observatory in England, presented different methods of observing the transit of the spot across the central meridian[19]. One of them was Jędrzejewicz's method. After comparing all methods one can come to the conclusion that Jędrzejewicz created his method because it was suitable for his refractor and micrometer. Other methods required a micrometer with more than two movable wires or a refractor with bigger objective. There was another method called "simple eye estimation", which according to the author was often used by amateurs, but apparently Jędrzejewicz was not interested in it.

Some interesting information about Jędrzejewicz can be found in the journal "Nature". In the first note about him, Jędrzejewicz's observatory is described and coordinates of it are presented. There is also information that "number of known observatories of this class (that is, at the level of private observatories in England) upon the continent of Europe is not great"[20]. It is also highlighted that amateur astronomers often observe double stars that were observed many times. They could make better use of their instruments and observe objects neglected by others.

In an article published in 1884[21] there is an abstract of an article from the Russian journal "Novoye Vremya", in which Russian private observatories are presented. Among

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[15] S.W. Burnham, *A general Catalogue of double stars*, The Carnegie Institution of Washington, Waszyngton 1906.

[16] S.W. Burnham, *A general catalogue of 1290 double stars discovered from 1871 to 1899 by S.W. Burnham. Arranged in order of right ascension with all the micrometrical measures of each pair*, The University of Chicago Press, Chicago 1900.

[17] T. Lewis, *Mesures of the double stars contained in the Mensurae Micrometricae of F.G.W. Struve*, Londyn 1906.

[18] W.H. Smith, G.F. Chambers, *A cycle of celestial objects observed, reduced, and discussed by admiral William Henry Smith. Revised, condensed, and greatly enlarged by George F. Chambers*, The Clarendon Press, Oxford 1881.

[19] J. Gledhill, *On certain phenomena presented by Jupiter's satellites and their shadows during transit, with a note on the red spot; and on some methods of observing the transits of bright and dark spots across the central meridian*, Monthly Notices of the Royal Astronomical Society, t. 56, 1896, p. 494-500.

[20] *Our Astronomical Column*, Nature, t. 20, 1879, p. 629.

[21] *Notes*, Nature, t. 30, 1884, p. 251-253.

them the observatory in Płońsk together with equipment and range of observations is listed with the conclusion: “His observations of double stars are considered most accurate by astronomers”.

Noteworthy is the fact that during the time when the information about Jędrzejewicz was published in “Nature”, there was only one piece of information about another observatory activity in Poland, that is sunspots observations made in Vilnius.

Jędrzejewicz, despite being an amateur, managed to build his own observatory, which he made into an institution at European level. He definitely stood out among astronomers in Poland. The wide range of observations he made and a great number of articles he published are the best evidence. His observations belonged to the mainstream of nineteenth--century astronomy and his specialty – measurements of double stars – was appreciated by professional astronomers.